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EDITORIAL

A CENTURY AGO

THE following passages are taken from the columns of the 1835 issue of this Journal and are reprinted not because they are spectacular, but because they are simple and sound. Since those staid and steady days of 1835 much water has rushed under the bridge and much gone over the dam—and the state of science today is more kingly than our forebears of that day ever expected it to be, exactly as its status, a century hence is bound to be beyond our wildest dreams.

It is interesting to note the names of some of the then current authors listed in Index. How indelibly they have written their names on the scroll of the centuries. How greatly indebted to them is modern science for having had built for it so secure a foundation.

Here they are—Aubergier, Becquerel, Biot, Dobereiner, Duhamel, Ellis, Faraday, Gay Lussac, Hare, Kunkel, Liebig, Merck, Payen, Proctor, Robiquet, Souberian, Tromsdorff, Wöhler,—truly a roster of the stalwarts, whose pioneer work made safe and sane the state of present-day science.

And they were interested even in the simplest phases of the medical sciences. Fancy Wöhler, that maker of epoch-making discoveries, stopping long enough with work to write a note on a collyrium. Particularly interesting, in view of its present extensive use, is the article on "Codfish Oil". And what a nauseating mess it must have been.—

(From the AMERICAN JOURNAL OF PHARMACY—1835)

Creosote Ointment—This preparation has been recommended in obstinate cutaneous affections.

It is formed of axunge ℥i.
creosote ℥i.

To be well incorporated in a porcelain mortar.

Hemlock Plaster.—This plaster has undergone numerous modifications in its preparation. M. Duclou has proposed another, which consists in adding to the melted mixture of resins and gum resins, a certain quantity of extract of conium prepared with the dried plant and alcohol. In admitting with the author the neatness of this mode of operating, it remains to ascertain whether the preparation is equal in its medical effects, to those made with the fresh plant; more especially as the active principle (conicine) is readily decomposable, during the drying of the plant, and the action of the heat employed in the preparation of the alcoholic extract—*Journ. de Pharm.*

Syrup of Orgeat.—M. Blondeau recommends the following formula as affording an excellent article:

Sweet almonds	lb.vj.
Bitter do.	lb.ij.
Gum Arabic	lb. j.
Sugar	lb.xx.
Honey	℥vj.
Orange flower water	℥viij.

Empyreumatic Oil of Chabert.—This oil which has obtained much celebrity in the removal of tapeworms is made by mixing

Volatile oil of hartshorn	℥iv.
Essence of turpentine	℥xij.

Digest for four days and distil till twelve ounces are obtained. The dose is thirty drops morning and evening.—*Journ. de Pharm.*

Upon the Use of Codfish Oil.

The oil of the liver of codfish (*oleum jecoris aselli*) formerly employed in medicine in certain countries has been again introduced into practice with great success in many affections of chronic rheumatism, and also as a vermifuge against the lombrice and ascarides.

This oil is obtained by three modes, which furnish products more or less pure. The first consists in exposing to the sun's rays, the livers of codfish piled up in tubs. A yellowish liquid flows from them (white limpid oil of codfish), destined for internal use. After the

livers have remained for some time they undergo a kind of putrefaction, and furnish a second product, *brown limpid oil.* Finally, by heating them in a cast iron pot, a third oily liquid, still more coloured and viscous, is obtained.

The *oil of codfish* is administered internally either pure, or which is a better mode, combined with the fourth of a glass of emulsion—the dose for adults, being two or three table-spoonfuls a day, and for children two or three tea-spoonfuls.

Externally, it is used by friction, either pure or combined with ether or ammonia. For the destruction of the lumbrici and ascarides it must also be used in the form of injection.

M. Caron du Villars, author of this article, announces that this medicine, which he considers as very valuable, although an unpleasant one, has never produced any alteration in the digestive functions, even when it has been given in very considerable doses.

Honey of Trebizond.—Mr. K. E. Abbott, in a letter read before the Zoological society of London, gave some account of the famous honey of Trebizond, spoken of by Xenophon in his history of the retreat of the ten thousand Greeks, as having produced the effect of temporary madness, or rather drunkenness on all who ate of it, without, however, causing any serious consequences. It is supposed to be from the flowers of the *Azalea Pontica* that the bees extract this honey, that plant growing in abundance in this part of the country, and its blossoms emitting the most exquisite odour. The effect which it has on those who eat it is as Mr. Abbott has witnessed, precisely that which Xenophon describes; when taken in a small quantity it causes violent head ache and vomiting, and the unhappy individual who has swallowed it, resembles as much as possible a tipsy man; a large dose will completely deprive him of all sense and power of moving for some hours afterwards.

Juniper Berries.—The fruit of the juniper is not a true berry, but a small cone, composed of three scales, forming a pulpy envelope, and containing triangular or quadrangular, hard seeds. These seeds are marked with a multitude of small cavities, each of which contains a small spiral tube. In the green seeds, these tubes are filled with

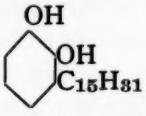
essential oil, but in the mature fruit they contain turpentine and resin; hence the unripe fruit contains more essential oil than the ripe, and still more than the dried article of the shops.—*Journ. de Chim. Med.*

Certainly we have complicated our laws . . . and our lives since those fallow days in 1835.

And certain it is too that the simplicity of expression—and the sincerity of the labors of these, our scientific "fathers of old", refreshes those who pause awhile from the whirlwind of current practices, to linger with their written record.

IVOR GRIFFITH.

RHUS TOXICODENDRON (POISON IVY) TOXIC PRINCIPLE OF. G. A. Hill, V. Mattacotti, and W. D. Graham. (*J. Amer. Chem. Soc.*, 1934, *56*, 2736, through *Quart. Jour. of Pharmacol. and Pharm.*). As the quantity of toxic material obtainable from the leaves was too small, the bark was employed instead. It was extracted with alcohol, concentrated and filtered. The filtrate was extracted with xylene, this solution concentrated in a vacuum, and finally distilled at a pressure less than 1 mm. The product was an oil, b. pt. 210° C., at 0.5 mm. pressure. This extract from *Rhus toxicodendron* was similar in chemical and physical properties to that obtained by Majima from *Rhus Vernicifera,* Japan lac. Majima had called this "urushiol," and shown that it was a mixture of at least three phenols, namely 1-*n*-pentadecyl-2: 3-dihydroxy benzene (hydrourushiol),



and two derivatives with double bonds in the side-chain. In the present case, from the "urushiol," was prepared its dimethyl ether, which was liquid and non-toxic. Hydrourushiol, m. pt. 59° C., obtained by reduction, was almost as toxic as "urushiol," and was converted respectively into the dimethyl ether which was non-toxic, the diacetate and dibenzoate, all three solids, with melting-points agreeing with those given by Majima. A. A.

ORIGINAL ARTICLES

SEA—INSIDE*

Being the Story of Sea Water—Where Life Began—Where Life Ends

By Ivor Griffith, Sc. D., Ph. M.

"ONCE upon a time" (according to a legend which every history primer told in the days before primary education became secondary), King Canute of Danish England, to impress his warriors with the limitations that even a King must acknowledge, had his royal chair carried to a beach nearby, where the great North Sea flung its angry waves against a sandy slope.

"Stop!" commanded the King—and exactly as he expected it, the sea spat spray in his face and sand slid in his sandals. And accordingly, and ever since, Englishmen the world over, on the slightest provocation, sing "Britannia, Britannia—Rules the Waves."

In any event a king's attempt to stem an angry tide and to address the sea resulted in a ducking.

And somewhere in the literature of the so-called popular science, I came across another salute to the sea—penned by a word-wild chemist. Here it is:

"Oh, Sea, Thou saline and undulent aqueous solution of halides, carbonates, phosphates, sulphates, and other inorganic compounds. What mysterious colloids are dispersed within thy slightly alkaline bosom? What silent and unseen reactions vibrate in dynamic equilibrium, constantly destroyed and instantly restored, among thy unnumbered oscillating molecules? What uncounted myriads of restless ions migrate perpetually throughout thy tentatively estimated volume? What unguessed phenomena of catalysis, metathesis, and osmosis transpire in thy secret fluid profundities under increased pressure? What cosmic precipitates descend in countless kilograms upon thy argillaceous, gelatinous, silicaeous, diatomaceous and totally unillumined bottom? In short, most magnificent reservoir, what is thy flow-chart and complete analysis?" Which to my way of thinking seems to invite more of a drowning than a ducking.

*One of the Series of Popular Science Lectures, given at the Philadelphia College of Pharmacy and Science, 1935.

Yet in this bucketful of words, are reasons galore why the subject of this evening's discourse cannot in the compass of time allotted to it, find else than perfunctory treatment.

Some time ago, another lecturer in this course, elected for his subject—"Little Drops of Water"—and used the best part of two hours to round out his story.

Consider, therefore, what a navigating handicap there is for one who has the "Boundless Main" whereon to sail his fleet of words—and what a task 'twill be to bring them all to port again before the day is done.

And so, with a guarantee that the subject will be treated in such wise, that its depths will not be sounded, nor its surface sailed so tediously as to nauseate the most tender minded—let us, together—even when hope for a brief dissertation seems gone—sail on—sail on.

Shakespeare's sea dirge seems a most appropriate starting point:

> "Full fathom five thy father lies
> Of his bones are coral made
> Those are pearls that were his eyes
> Nothing of him that doth fade
> But doth suffer a sea-change—
> Into something rich and strange.
> Sea nymphs hourly ring his knell,
> Hark! now I hear them—ding, dong bell."

And the Bard of Avon, although he may have been neither a chemist, nor a biologist in the modern acceptance of the terms—was certainly an inspired, understanding interpreter of the origin and destinies of the material make up of every living creature that has ever existed on this planet called earth. For it is from the sea that all living matter came—and the sea will at last inexorably demand the solubles of all the dead's dissembled residues whether it be by the short route of Shakespeare's, or by the longer road suggested in Bryant's Thanatopsis.

> "Old Ocean's gray and melancholy waste
> Are but the solemn decorations all
> Of the great tomb of man."

We shall not of necessity go down to the sea in ships—but certainly in chips—of molecular matter, borne to the ultimate solution of all our griefs, and wrapped in a blanket of water.

THE SOLUTION OF LIFE AND DEATH

Water preceded life on this planet. That is obvious—and reasonable, for where there is no water there can be no life. No matter whether life elects to serve its time in the simple-single-celled amoeba, or in the trillion-celled, complicated and conceited creature called man—short indeed would be its stay unless it had the varied services of its versatile ambassador—water. Life comes to us wrapped up in water, and death, so often the solution of all our problems, is also always a water reaction. Indeed, water gets us even after death, for it is largely through its agency that Nature uses our substance over again in the fabrication of other creatures, so often improvements over the originals. And in this solvent cyclic scheme the sea is most important.

But, asks someone, whence came the sea? And the answer is easy if the imagination is elastic. According to that great group of guessers, the nebular hypotheticators, headed by the great Frenchman LaPlace, the earth was once devoid of water.

DIFFIDENT DROPS OF RAIN

All one has to do is picture this world primordial—let us say a billion or two years ago—a hot ball of matter, broken here and there with fissures from which issued streams of molten rock. The original thin atmosphere has enlarged, and finally there has come a time when the water vapor produced by the electric union of hydrogen and oxygen arrives at dew point—and down comes the first diffident drops of rain that this world ever knew.

And what a hissing, steaming reception the gigantic cauldron called earth afforded this first aqueous visitor. Back to the sky the water molecules scamper, there to await until the cold dome of heaven again condensed them to a cloud.

Cloudburst after cloudburst fall like Chinese regiments, and earth is a vast distillery. At last, however, heat gives in and water gains its victory. The skin of the earth is cool, and water remains in its cavities. Hot, muddy puddles grow to dismal ponds, and ponds to lifeless lakes—the lakes in turn become the dank primeval seas, and the seas the heaving oceans.

And yet no life.

Not a single blade of grass—not a creature on the land or in the churning water—nothing but bare, hot rock, hissing, crackling, crumbling, underneath relentless showers. Fire and water are the

only busy realities—and fire is now the slave and servant—and water monarch of all it surveys.

Then came Life.* Just how—just when—just why—no one seems to know. But certain it is that water mothered all things living. Certain it is too, that some day—far away—water will leave the earth again—and leave it like the moon, a cold and lifeless ball.

Dr. Lowell, the famous astronomer, went so far as to describe the agonies that our descendants would suffer, and the tremendous irrigation schemes which they would of necessity devise as their water supply grew less and less. Possibly the canals and waterways in Mars are evidence of such a current calamity in that far distant planet. This of course, somewhat discounts Tennyson's song of water, which ends with "For men may come and men may go, but I go on forever."

The Bible is much less verbose in its explanation of the birth of the sea. For in Genesis we read—

"And God called the dry land earth, and the gathering together of the water called He Seas—and God saw that it was good!"

(Gen. 1:10)

But the first sea-water was fresh water, free of its present plethora of solubles, and certainly lacking in salt. Yet knowing the hunger of water for that which is substantial, solid and soluble, it is

* E. E. Free, writing in the *Forum* about the generation of life, states:

"We can now calculate what was the composition of the air and of the ocean when in the course of time the earth became cool enough to hold a watery ocean at all. The air contained no gaseous oxygen as it does now. All the oxygen had gone into chemical combinations. Whether the air contained any gaseous nitrogen is uncertain. What it unquestionably did contain was carbon monoxide, the deadly gas,—existing in the exhaust of automobile engines—and prussic or hydrocyanic acid. In the primitive ocean, having absorbed gases, and therefore full of deadly prussic acid and overlaid by an atmosphere containing large amounts of a poisonous gas no less deadly, the first life arose.

"It is reasonable to assume that there occurred some natural chemical synthesis of glycocoll or of a similar material. Glycocoll is the simplest amino acid, composed of four elements, oxygen, hydrogen, carbon and nitrogen obtained either by destructive treatment of protoplasm with caustic chemicals, or by a succession of chemical reactions between the three substances of the primeval ocean mentioned: prussic acid, carbon monoxide and water. During the three or five billion years which were to elapse before the period when we find actual traces of life in the rocks, there was ample time for such simple substances, as glycocoll, to undergo additional chemical changes and combinations and to be built up into more complicated forms perhaps at last into substances equivalent to our modern protoplasm."

easy to surmise how soon the sea came to be briny and as full as it is of something of every element.

From the first fresh water of universe to the present state of the sea, is a tremendous development. Contemplate, for instance, upon this estimate of the chemical content of just one cubic mile of old Atlantic's waters, as compiled by some professor who prefers this sort of dabbling arithmetic to teaching horse sense to his classes. Here it is: 128,284,403 tons of sodium chloride or common salt; 17,946,522 tons of magnesium chloride; 358,270 tons of magnesium bromide; 1,400 tons of fluorine combined as fluorides; and a minimum of 90 tons of iodine combined as iodides; to say nothing of the thousand and one other solids contained in lesser proportions.

Indeed the composition of the sea is as complicated as the composition of the land that it covers, and of the silt and soil that surrounds it—for it is natural that a share of every substance on and in the earth must sometime find the sea.

How little understanding of this important fact is found in the words of another poet who has taken every adjective out of universe leaving this barren bit of pouting poetry—

> "The earth is just a lot of dust,
> The sky's a lot of air,
> And the sea's a lot of water
> That happens to be there."

What a fool's philosophy is reflected in the words and what a monument to ignorance. For in the salt of the sea alone is sufficient romance of origin and diversity of use, to intrigue not only those who write, but those who also think.

Salt or sodium chloride as the chemist calls it is a benign alliance of two malignant elements, sodium the swash-buckling, arch-enemy of water, and chlorine, the green-eyed ugly gas, so poisonous to life that the God of war himself has used it as a mighty weapon. Yet when wed, these toxic devils lose their elemental fury, and lead a useful, mild existence.

The physical properties of salt bespeak its mild-mannered meekness. Soluble in water, non-toxic in moderate amounts, non combustible and stable to a high degree, it becomes one of life's most valuable servants. Without its competence of salt the animal body would soon be derelict, for as we shall later prove, every living cell

in that busy tissue called blood, must have its share of salt to enable it to keep life's fires burning.

Yet by the same token, salt in excess is a violent poison, and in China suicide by salt is said to be a much maneuvered means to an economical end. Shipwrecked mariners know full well the menace of drinking sea water—though sea water runs in their veins.

But how or why came the salt of the sea is another moot question. In Child's Geology of 1832 we are told that "He who formed the earth and the sea knew that by saltness only could the ocean be kept sweet and that this saltness is absolutely necessary in order to preserve the ocean from putrefaction." And this is not as childish as it sounds.

If it is true that the earth was formed by the gradual cooling of a molten mass, it is reasonable to suppose that the primeval ocean formed out of an atmosphere of water vapor was fresh-water ocean. Then by the incessant weathering and solution of the rocks the salt has been leached out and has accumulated in the ocean from which there is no outlet for its surplus material, except for its volatiles which go back to the atmosphere by evaporation. There are some who believe that much of the salt in sea water is actually produced there by interaction between sodium sulphate and calcium chloride, both of which are carried into the sea by the rivers that constantly feed it. By a merry exchange of acid radicles the calcium chloride is converted into the less soluble calcium sulphate or gypsum, which sinks to Davy Jones' locker, and the sodium sulphate into sodium chloride or common salt, which gives the sea its salty sweetness. Such a process is a very simple, yet a very certain bit of chemistry.

And millions of years of continuous washing and bleeding of the solubles of earth to the sea have taken their toll from the land, exactly as the land has, at times, taken its toll from the sea.

THE SEA CAUGHT NAPPING!

For in the hectic, heaving changes that have come to the surface of earth, the sea has more than once been caught napping. During such upheavals, sections of ocean have been cut off by the careening land, to form isolated salt lakes. The sun has dragged the water from many of these lakes, leaving large deposits of salt and other soluble substance. Some such deposits are found right on the surface of the earth and others are underground, having been covered by more recent formations.

In other words, what man is doing today in isolating tracts of sea-water and separating the salt by solar evaporation, must have been practiced by nature on a large scale throughout the ages. The alternating layers of salt and clay that are found in some rock-salt deposits are explained by the fact that the clay represents the mud that was brought into the lake during the rainy seasons.

The immense salt deposits of Utah and Nevada were once the beds of prehistoric salt lakes, and so is our famed Great Salt Lake the remains of a large inland sea that once covered that particular area. Should the climate become drier than it is now the shrinkage of the Great Salt Lake, which has been going on for ages, will continue until a huge salt deposit remains.

All over the earth tremendous deposits of salt attest to the drying up of pieces of the primeval oceans, and somewhere in the Carpathian mountains is the most noted of them all.

The Chamber of Commerce of Weilicza, where these salt mines have been worked since the eleventh century, proudly announces to the world that the unworked deposits are still 500 miles long, 30 miles wide and nearly a half a mile deep—which comforts one with the thought that although all the coal and the oil of the world will some day be depleted, there will always be salt enough to season our soups and to keep our Sunday mackerel sweet and wholesome. But enough for the moment of such landlubber reflections, and let us hie to the sea again.

Now there are so many seas—good seas and bad seas, deep seas and shallow seas—blue seas and black seas—live seas and dead seas—that for our specific pedagogic purpose here, we had better select just one—row with courage to its very center, and then with one gargantuan splash, plunge, eye-open, to its saline cellar.

THE SEA YOU SEE IS THE DEAD SEA

You are now in Palestine, and in deep water already. The sea you see is the Dead Sea—the saltiest sea in existence. It is deliberately selected as our sample sea because it is different, and because the world strangely owes it an apology. Maligned for centuries by people who did not understand its real character, called "Dead" because it is so heavily loaded with mineral salts that nothing living seeks its waters—charged with evolving such a miasmatic vapor that even seagulls are sea-sick when they assay to cross it; reported as being so buoyant with salt that those who sailed it never carried the cus-

tomary life savers—such has been the reputation of the so-called "Dead" Sea. Even the climate of the valley where it sullenly rests is reported in old traveller's tales as dreadful and deadly.

But the old "dead" sea was only "playing possum." Within the last few years so many things have happened on its shores, and so many age-long beliefs disproved, that "the Dead Sea today is a thing of life, pulsating with health and conferring benefits on thousands of human beings." These are the words of Major T. G. Tulloch*, upon whose recent lecture before the Royal Society of Arts in London, England, these paragraphs are freely drawn.

Palestine is governed under a British mandate, and Major Tulloch and his associates being Britishers, they have readily secured a concession to exploit the possibilities of the Dead Sea after numerous analyses had convinced them that its waters were a vast potential source of common salt, potash and bromine. They organized Palestine Potash, Limited, which started practical work in 1930. The astonishing progress made since then amply confirms their judgment, and proves that man at last has been able to do what the crab, the skate and the lobster have done ever since their origin—namely, to grab and grasp for their own the chemicals that exist in the sea.

As the fresh water from the Jordan and other streams dilutes the surface water, sounding experiments were made which showed that the salinity increased in proportion to the depth, until at something like 200 feet a constant analysis was noted. A 30-inch pipe line, 2800 feet long was therefore laid out from the shore to approximately this depth, and pumps provided which discharge into an open canal. Along the shore and encircled by the canal great evaporating pans covering thousands of acres were constructed. Most fortunately for the success of the venture the local soil, which is alluvial clay, proved impervious to leakage, since a porous soil would have involved an enormous expense in pan construction.

The pans are about two feet deep, and the water from the canal goes first to the upper series of pans. Evaporation is by the sun's heat, assisted by the steady breeze which blows all day from the south and all night from the north for most of the year. As evaporation proceeds the concentration of salt increases, until the least soluble of them, namely, sodium chloride or common salt, is first deposited. The liquor is then run into the next lower series of pans, where, under

* From Arthur D. Little's *Industrial Bulletin.*

continued evaporation, the double salt of magnesium and potassium chlorides known as "carnallite" is thrown down. The remaining liquor from these pans is heavy with magnesium bromide, from which bromine itself is separated easily. Potassium chloride, 98 per cent. pure or better, is separated from the carnallite by washing with fresh water.

The important part which the mineral resources of the Dead Sea are destined to play in the world's economics is indicated not only by reason of the simplicity of their production, but also on account of their vast quantities, which, computed to close limits, are as follows:

	Millions of Tons
Magnesium Chloride	22,000
Sodium Chloride (common salt)	11,000
Calcium Chloride	5,000
Potassium Chloride	2,000
Magnesium Bromide	1,000

Moreover, it is estimated that an additional 40,000 tons of potassium chloride is brought into the Sea each year by the streams flowing into it.

Major Tulloch calculates that if potash from no other source were available the quantity existing in the Dead Sea would supply the world's requirements for over 2000 years, and by that time your potash and mine will have sailed the seas again.

Shipment is made by motor truck to Jerusalem, twenty-five miles away, and thence by rail to the docks of Haifa, some 115 miles in all.

Astonishing as are the values revealed by this development, the present status of the Dead Sea as a health resort is even more remarkable in view of its previous sinister reputation. Major Tulloch tells us that the company has been at work continuously, summer as well as winter, for over four years, and there has not been a single case of illness among the several hundred workmen, though many of them came from cold northern climates. Last year a seaside and health resort named Kallia (which is Latin for potassium and Yiddish for Wildwood) adjacent to the potash company's works, was opened on April 30, and was patronized by hundreds of visitors daily all through the summer; and on one occasion, in the middle of July, no less than 2000 vacationists came to dance to the tunes of a local Ben Birney, and to bathe in the light of the Zion moon.

THE LIVE "DEAD SEA"

The remarkable healthfulness of the northern shores of the Dead Sea appears to be due to several factors, one of which is the unique fact that at 1300 feet below sea level the air is so much denser that 6 per cent. more oxygen is brought into the lungs at each breath than is the case at normal or sea level. There is, moreover, an absence of fogs and an extraordinarily clean, pure atmosphere. Added to this are the stimulating and energizing effects of bathing in the densely saline waters of the Dead Sea.

And better than anything else, so we are informed, bathing frequently in this buoyant sea has a beneficent dwindling action upon those, who having honestly won their cream puff figures, mostly by exceeding the feed limit, hanker after streamline design and a greater girth control.

Another clever and spectacular British achievement is a process originating in Teddington, England, and described in a recent bulletin of the Arthur D. Little Reasearch organization:

With this new development it has been found possible to pass ocean water through a succession of filters which entirely removes its salt content. Salt dissolved in water may be considered as a mixture of equivalent amounts of caustic soda and hydrochloric acid intimately mixed. In the English process, the salt solution is passed through layer number one, which absorbs the caustic soda, then through layer number two, which absorbs the hydrochloric acid, then through a similar pair of layers to repeat the process on what may have escaped the first stripping. In this way, by removing the two parts separately, salt can be eliminated, whereas there is no analogous method of removing the chemical sodium chloride (salt) as a unit, all at once.

Perhaps the most interesting part of the English method is the nature of the absorbents used, which are not mineral, but are synthetic organic chemicals of the formaldehyde resin type. The base-absorbing resin is prepared from tannin and formaldehyde, and the acid-absorbing resin from aniline and formaldehyde. Regeneration is possible, so that a cycle can be maintained. So far, the economics of the system have not been investigated, but *Chemistry and Industry,* the British periodical, has a real enthusiasm for the possibilities for this process which "was the work of an ordinary Englishman working in a British Government Laboratory." Perhaps "ordinary" should be qualified a bit in view of the result achieved.

And now for a sea-swing closer to home—and a real story of modern enterprise. It has been said by an English physicist whose recorded dreams are his profoundest gifts to science, that the released atomic energy from one bucketful of sea water would provide power enough to dynamize the whole world's mighty fleet of ships. But he did not envision the reality nor enlighten us as to how that energy might be secured to put to work.

TO THE SEA FOR POWER

Not so, however, with the diligent chemists of America, whose more practical minds sought to get from sea water that which it would less grudgingly give.

For instance—when the automobile became a democrat, and its owner a plutocrat, the old-fashioned fuel would hardly suffice for so sensitive and speedy a driver. The high compression motor growled and grunted with every explosion of gas—and something had to be done to stop it.

Along came Ethyl—tetra-ethyl lead—and ethylene dibromide—in the manufacture of which bromine was most essential. Added to gasoline these chemicals silenced its knock.

BROMINE AND GASOLINE

Now bromine is sister to chlorine, and with the rest of the haloid quartette, fluorine and iodine, spends most of her time out at sea. Ten years ago, a paltry two million pounds of bromine sufficed to fill the medicinal and industrial needs for this element and its compounds, and they made it mostly from inland bitterns and brines.

But when the anti-knock craze hit the producers of motor fuel the usual sources of bromine were totally inadequate. And so to sea the chemists went—and so successful was their queer quest that ten times two million pounds of the stuff now annually comes from the sea. Mind you, this is in spite of the fact that only four grams of the element are contained in every gallon of brine.

The Ethyl Gasoline Corporation and latterly the Dow Chemical Company, at the mouth of the Cape Fear River on the Atlantic shores, beyond a promontory that keeps the sea from river dilution, have a magnificent modern plant which pumps a billion gallons of sea a day through its vast extracting processes. The bromine is dislodged from its nautical partnerships by the use of chlorine, its zealous sister, a displacing technic familiar even to freshmen. In this way 15,000 pounds of the vicious element bromine are daily claimed from the sea. For the time being other substances are not recov-

ered, although a special research is now under way to broaden the scope of the work.

Once it was thought that sea water was a simple solution of salt. Modern analyses however, reveal its much greater complexity. Out of the ninety-two known elements, forgetting for a while the dizzy isotopes recently brought to confound an already confounded chemistry, thirty-two separate elements have been separately identified in sea water. Many of them occur in such small quantities that their presence can be revealed only by the spectrographic analysis.

For a long time there was a tendency on the part of the chemist to disregard the importance of those substances which are found in the sea water in minute amounts, but recent discoveries in the physiology of nutrition has taught us to pay more respect to them. We know today, that iron, copper, manganese and iodine are necessary for the normal functioning of our bodies. Traces of silver and gold and radium are also found in sea water. More radium exists in the mud of the sea than in the ordinary rocks of dry land, Dr. Robley D. Evans of the University of California has found. His tests show that radium is being deposited constantly by ocean waters. There is no hope of mining sea mud for radioactivity. Dr. Evans made his experiments merely to test his new method of detecting extremely minute amounts of radium and radon gas emitted by radium. Each ounce of mud contains three trillionths of an ounce of radium.

And who knows but that this radio-activity has much to do with the teeming, pulsing life of the sea, that undetermined something that grants the sea its great fertility. The triple play—Shakespeare to Hamlet to Horatio—"There are more things in heaven and earth than are dreamt of in your philosophies"—must contemplate the sea as well—for as yet the secrets of the sea are only half divulged.

THE NOBLE METALS

It has been estimated that there exist dissolved in the sea 13,300 million tons of silver, and a cubic mile of sea water is said to contain nearly a hundred million dollars worth of gold, which despite a giddy government's attempt to corner that coveted metal, is as yet as useless a gold as the gold that gilds the goldfish. And though the actual gold content of the sea is only one ten-thousandth of a grain to the ton, someday—and perhaps not such a faraway day, this metal of metals will be mined from the sea. Fritz Haber, who successfully mined the air for niter, failed to practicalize the claiming of gold from the sea—but

some day some Scotchman may do it. Indeed Dr. Stewart (whose name suggests a Caledonian origin) of the Dow Chemical staff, operating the sea water bromine plant in Carolina, specifically states that "now that the recovery of bromine, which is present to an extent of less than four grams to the gallon has been successfully executed, it does not seem beyond reason to expect the chemist of the next decade to extract gold from sea water commercially."

And now let us turn for a while to some livelier aspects of sea. Let us get personal—admitting a lot, but imagining more.

Evolution we define as change, than which there is nothing more permanent. The evolutionist acknowledges the unceasing change that goes on in cosmos, earth and life. For him the everlasting hills do not endure; he knows that the continents lift and subside; that the very elements of which earth and suns are made are forever transmuting themselves. Energy as well as matter—is shifting from one form to another. Nothing is static in the inorganic world; nothing is fixed. And man's climb first to the top of his Simian roost, and down again to his present two-legged state, has been a long and arduous achievement.

Evolutionists claim that all life was once marine or submarine—that the antecedents of every creature now living, originally like Venus, came from the sea. And there are many evidences about, which incline to prove their story—although a question they have not been quite able to answer convincingly, is where the sea secured its life.

SEA INSIDE

One of the slender threads wherewith they join their arguments is in the remarkable comparison which they make between animal blood and sea water. When blood is permitted to coagulate, the clear, rather colorless serum or plasma which separates, has, exclusive of its protein content, a composition very like that of sea water. It contains so much sodium chloride—so much phosphates—and carbonates—and so much combined iodine—in a ratio similar to that of sea water.

The contention is that whereas we were once limpid jellyfish that floated lazily on the dark primeval seas—we are now so evolved and involved that a share of the sea floats diligently within us, with an ebb flow in every heart beat.

Certain we are that life in us could not get along without the sea elements that race in our blood stream. Lacking the little salt

that parades its molecules constantly—through sleep and waking periods in us—no longer would life remain intrigued.

Blood, lost through hemorrhage, may not be replaced with distilled water else the recipient dies—but the injection of an artificial salt of a sea water, which the Pharmacopœia calls "Physiological Salt Solution" is a safe procedure.

This solution contains slightly less than 1 per cent. of common salt (0.85 per cent.).

States an old Welsh proverb: "Salt brings balm to every human woe—but it must be as salt of tears, as salt of honest sweat—or as salt in the heart of the sea." The old Welshman whose nimble tongue and nimbler wit composed this Cambrian proverb could hardly have known that the salt of tears, the solt of sweat, the salt of blood and every body salt are cycled from the sea.

Salt is eliminated in all our body secretions. The average weight of salt consumed by sensible persons is about one-half ounce a day. Only a little more than one-sixth of this amount is retained as necessary to bring the acid to our gastric equipment, and for other uses, the rest of it being eliminated. Thus there is a ceaseless cycling of salt from the quick to the dead, and back to the quick again. It is for this reason that drinking water containing an abnormally large amount of chlorides is looked upon with suspicion, unless the presence of these chlorides can be explained on other than a sewage basis.

WHY THIRST? And every one knows that salt is essential to the welfare of the animal body. It has been shown that animals wholly deprived of it will weaken and eventually die. Indeed, there are few things more distressing than the salt hunger that comes from an insufficient amount of salt in nourishment. One of the chief functions of salt in the body is to provide the proper concentration for the blood serum. It seems that the proper functioning of the body depends upon favorable conditions of osmotic pressure. In order to maintain these conditions it is necessary to regulate the intake of water and salt within certain limits. The attempt on the part of the body to establish an equilibrium is recognized when we recall that the taking in of a large amount of salt causes intense thirst and on the other hand the excessive drinking of water produces a desire for salt. Even sweat has its share of salt, that of humans (who normally perspire nearly a quart a day) containing 3/10

of 1 per cent. in the female, and nearly 4/10 of 1 per cent. in the male!

Then there is our mite of iodine from the sea. And what a mite it is. Yet without it we are hopeless idiots unable to regulate our body fires, and everything we do we either overdo or underdo, depending upon the functioning of the iodine gland that keeps us in touch with the sea.

OUR MITE OF IODINE

This gland, by the way, is present in all vertebrate animals, beginning low down in the scale, with the eels and lampreys and complicating its structure and increasing its size as the evolutionary scale increases. In fish, the thyroid occurs as small scrubby patches little larger than pin-heads and scattered along the important blood vessels. Then in the reptiles it is a little larger and more compact, and still more prominent among the birds and the mammalia. But it is in the primates and in man that it attains to greatest size. The farther we are from our early home in the sea the larger the thyroid gland—and since evolution never stops its course more than likely man's appearance may eventually change, because of thyroid growth, so that he will no longer be the good looking creature he now thinks he is—but he will have evolved into a pop-eyed, fat-headed, chinless creature—the space between his chin and his collar button having been taken over by his constantly enlarging iodine plant.

But that it too far off to worry about. Much can happen in a million years. Listen. The high tide of this element in the blood is about one grain of iodine to ten million grains of blood, or less than a hundredth of a grain to the entire circulation. The reservoir of iodine in the body, namely the thyroid gland, only holds a third of a grain (about 25 milligrams) and in order to keep this reservoir full one only has to consume per day, in his food or drink, less than a thousandth of a grain of iodine. No wonder some folks believe in homeœpathy. It seems the Great Designer did!

FRY-DAY

I do not know the canons of the Church of Rome nor its history, well enough to identify the origin of the custom of sea-food for Friday. In any event it is a good custom, for though Friday euphoniously admits of a fry—fried fish will furnish our weekly requirements of iodine far better than anything else we might fry, or try. And so, much like the Mosaic indictment of pork whereby our Jewish friends are denied the blessed privilege of

a ripe red ham unless they call it pickled salmon—Friday for fish may have had a hygienic sanitary origin.

Moses may have fooled Pharoah with a lot of phony tricks, but he led his people with real thinking.

And while we are speaking of these primitive, intuitive health precautions—listen—while London was yet a muddy fen and Rome a rambling village—China had a mind of her own, and a culture of her own as well. When the civilizations of Athens and Rome were still in knee pants—Cathay had spun her cycles. Four thousand years ago the Chinese had guessed that goiter was a dietary deficiency disease—that it mostly attacked people who shunned the sea and found their safety far inland—that it yielded to treatment with sea medicaments—salt of the sea—sponge from the sea—sea weeds and coral.

Yes, indeed, the art of the ancients was in knowing how—not why.

Burnt sponge was used in medicine for centuries, only to be displaced in modern times by iodine and its compounds. Indeed the first Phamacopœia of the United States, published in Boston in 1820, gave it a place though it was deleted in the next revision. So too was a variety of burnt sea weed included. Today burnt sponge and bladderwrack are still used by the eclectic physicians, who believe that these natural products in contradistinction to iodine or its definite artificial compounds, contain a structural "something" that must be very different from pure iodine. And they may be correct in their assumption.

A strange fact regarding sponge is its property while alive of abstracting iodine from sea water. In some tropical species of sponge the iodine content of sponge ash may run as high as 8 to 14 per cent., while sea-weed ash from which some commercial iodine is obtained rarely exceeds 1.5 per cent. Since it is assumed that all the iodine in sponge comes from sea water and sea organisms, it has been calculated that one pound of sponge contains the total iodine content of twenty thousand tons of sea water. Rather a remarkable figure.

Most sea organisms, plants and animals too are rich in iodine. Even the humble oyster, whether brought up in well-aired beds or not, contains his share of iodine.

Sea water contains about 1/300th of a grain of iodine to each gallon (0.05 mgm. per liter). It is of interest in passing to note that the Great Salt Lake of Utah contains but a little more iodine (about

1/200th grain to the gallon), whereas it contains five times as much salt.

Of interest too, is the fact that we have enough iodine in the sea to last our children for a long, long time. Practically all of the iodine in this plant is in the sea and another dabbler in useless arithmetic has figured that it amounts to a few pounds short of sixty billion metric tons, which antiseptically leaves us nothing to worry about.

South Carolina has capitalized the alleged heavy iodine content of her vegetables by ridiculously adding the word *Iodine* to her automobile license plates, and by circulating a silly slogan—

A potato a day
Keeps goitre away.

Which shows how the low surface tension of ignorance can make even the so-called authorities run away from sound sense. The "Carolina Moon" *will out*.

Yet much has been constructively done to awaken the world to the realization of the fact that iodine deficiency in food is the commonest cause of goiter and other diseases. The resulting world-wide movement to insure the presence of sufficient iodine in the diet to prevent these dreaded diseases is one of the greatest prevention measures undertaken by man in the interest of good health. Yet the wholesale methods used have not been without danger for there are types of gland affections which are radically aggravated by iodine medication, and are only amenable to surgical care.

Had we more time at our command we might have dwelt more fully upon these prophylactic measures—such for instance as the now tabooed charging of drinking water with iodides, or the general use of iodized salt. Iodized salt, containing from 0.02 to 0.025 per cent. of iodine in the form of iodides, is now available in the stores. But we repeat that with community medication of this kind, it must not be overlooked that harm can come from feeding iodine to individuals who already have enough or too much, just for the sake of catching those who have too little. It is a matter always of individual treatment. Nor must we overlook the danger of inducing in the individual through over-dosage that uncomfortable chemical disease, iodism. Indeed it is not always a matter of over-dosage, for to iodine as well as to most everything, there are persons who display idiosyncrasy.

Yet in spite of our alleged progress in the etiology and treatment of goiter and other thyroid disorders, warning comes recently (April, 1935) from Dr. Arnold Jackson of Madison, Wis., that thyroid diseases are decidedly on the increase. As many as four-fifths of the girls and one-fifth of the boys living in the great goiter belt, which extends from Boston to Seattle, are afflicted with goiter, Dr. Jackson found in a nation-wide survey of the problem. Cretinism, resulting from this type of goiter, is more prevalent in the United States today than at any time in the nation's history.

But we are digressing too far from our text—and postponing too long, our Amen.

So—abruptly—come we to the close of our sea sojourn—stopping at the harbor of "just enough." There was much more of the sea to be seen—and more to contemplate—but like every other voyage, even a verbal voyage must have its sensible end.

One hope, however, finds expression here—and it is that my listeners touching ground again, will find their land-legs not unsteady, nor their minds still too much at sea—for all the odd things we have said.

And I end as I began—with a swinging song that carries the cry of the primal cell—the lilting, liquid, lullaby urge of every living particle that constitutes our bodies—the death bed dirge of every animate entity.

"I must go down to the seas again, for the call of the running tide
Is a wild call, and a clear call that may not be denied.
And all I ask is a windy day, with the white cloud flying,
And the flung spray—and the blown spray—and the sea-gulls crying."

SCIENTIFIC AND TECHNICAL ABSTRACTS

Compiled by Arthur Osol, Ph. D.

Sterilization by Dry Heat at 150° C. With Special Reference to Oils. C. E. Coulthard. *Quart. Journ. Pharm. Pharmacol. 8,* 90 (1935). Heating to 150 degrees C. for one hour is recognized by the British Pharmacopœia, 1932, as a satisfactory process of dry heat sterilization for suitable materials. This procedure has been criticized (*Pharm. Journ. 130, 479,* 1933), and, at the request of the Pharmacopœia Commission, additional tests upon the efficiency of this method of sterilization have been carried out. This paper records the results as part of this work.

Preliminary tests were carried out with soil-spore mixture (made by mixing soil and dust with spores from old cultures of *Bacillus subtilis* and *Bacillus mesentericus* and allied organisms) and with chopped straw, potato scrapings and rice starch, all of which usually contain very highly resistant spores. Each substance was heated in a test-tube plugged with cotton wool. In testing the smaller amounts, 10 cc. of sterile nutrient broth was added aseptically to the cooled material and sterility tests made with this broth. From the larger amounts approximately 0.5 gram was removed, and added aseptically to 10 cc. of nutrient broth, tests being made from this. In either case the original broth tubes were incubated at 37 degrees C., together with further aerobe and also anaerobe culture tubes for the five day period as specified in the British Pharmacopœia. The results of the tests indicate that thirty minutes heating is sufficient to produce sterility in some cases but that sixty minutes of heating served to produce sterility in all cases.

Attention was then turned to the sterilization of oils. These tests were carried out by: (a) sowing 1 cc. of the oil in the usual aerobe, and another 1 cc. into the usual anaerobe tubes and shaking thoroughly; (b) adding a few drops to melted nutrient agar at 45 degrees C. and shaking thoroughly until the medium had set. In each case the culture tubes were incubated at 37 degrees C. for five days. A preliminary test was carried out in plugged test-tubes upon small amounts of liquid paraffin and olive oil heavily infected with soil-spore mixture. The olive oil was found to be sterile after thirty

or sixty minutes heating at 150 degrees C. The liquid paraffin was sterile after sixty minutes, but not after thirty.

Further tests were then carried out by observing the effect of maintaining the oven temperature, rather than the oil temperature, at 150 degrees C. The results of the tests indicated that neither oil was sterile. However, upon raising the temperature of the oil to 150 degrees C. (the oven temperature being between 165 degrees and 170 degrees C.) both substances were found to be sterile after one hour.

Chemical tests carried out upon samples of olive and almond oils, sterilized by heating to a temperature of 150 degrees to 155 degrees C. for one hour, indicate that the heat treatment caused no significant deterioration.

A Note on the Sterilization of Oils. R. A. O'Brien. *Quart. Journ. Pharm. Pharmacol.* 8, 94 (1935). Samples of liquid paraffin, almond oil and olive oil were heavily contaminated with a spore-containing mixture of earth, hay and faeces, the mixture containing spores resistant to being heated to 140 degrees C. for one hour. The three contaminated oils were heated at 140 degrees C. for one hour, the thermometers being inserted deeply in the oil, and tested thereafter for sterility in a number of the aerobic and anaerobic media ordinarily used. One contamination only was found, in the meat broth tubes inoculated from the liquid paraffin. All other media were sterile. In a parallel experiment—heating to 150 degrees C. for one hour—all three oils gave no growth in broth, glucose broth and meat broth, when incubated under aerobic or anaerobic conditions, or on solid media.

The three oils were also submitted to Tyndallization by heating for one hour at 80 degrees C. on three successive days, one set being kept at room temperature and the other at 37 degrees C. between findings. Even when the oils were heated in sealed phials, Tyndallization was not completely effective. Six culture tubes of various media inoculated from the heated almond oil were sterile, from the olive oil five out of six, and from the liquid paraffin only two out of six. Sets of the three oils were contaminated with a pure culture of *Clostridium tetani,* and similarly Tyndallized. Typical growth of tetanus occurred in all tubes.

A Note on the Effect of Sterilization on Solutions of Calcium Chloride. C. E. Coulthard and G. F. Hall. *Quart. Journ. Pharm. Pharmacol. 8,* 96 (1935). Experiments with solutions of calcium chloride of various concentrations indicate that both Tyndallization and heating in the autoclave are suitable methods of sterilizing such solutions from the standpoints of change in appearance and pH, but the calcium chloride used must be of a high degree of purity. The British Pharmacopœia specification for calcium chloride does not exclude material which, owing to free lime content and to other impurities such as compounds of iron and aluminum, may be unsatisfactory for this purpose.

A Note on the Sterilization of Injecto Bismuthi. B. P. C. E. Coulthard. *Quart. Journ. Pharm. Pharmacol. 8,* 98 (1935). The results of tests carried out by the author appear to indicate that injection of bismuth can be sterilized by the autoclave process even if the various components are not previously sterilized. Tyndallization will probably give a sterile preparation in actual practice, particularly as the training of pharmacists develops the habit of aseptic working; with injections deliberately contaminated with enormous numbers of spores, however, it is insufficient.

The Preparation of Ergometrine. H. W. Dudley. *Pharm. Journ. 134,* 709 (1935). The widespread interest which the announcement of the isolation of ergometrine (Dudley and Moir, *Brit. Med. Journ.* 1935, page 520) has aroused makes desirable the publication of the method by which it is now prepared from ergot. The method about to be described was devised after a study of the properties of the original specimen isolated by the technically cumbersome process given in the original communication, and renders ergometrine by far the most easily obtainable alkaloid of ergot. It is suitable as a basis for large-scale operation, with modifications appropriate to manufacturing conditions.

The quantity of 1 kg. of defatted powdered ergot is moistened with 1.5 liters of absolute methylated alcohol (5 per cent. methyl alcohol) to which 50 mils of 0.88 ammonia have been added. The

wet material is transferred to a percolator and extracted with absolute methylated alcohol. After about 3 liters of percolate have been collected, the extract is evaporated to about 200 cc. in a vacuum, the water bath temperature being kept at 40-45 degrees.

To this concentrate are added about 300 cc. of 0.25 normal sulphuric acid (sufficient to render the reaction faintly acid to congo red), and the distillation continued until all the residual alcohol has been removed. Fat separates as the content of alcohol decreases. The fluid is then chilled to about 2 degrees, when most of the fat becomes hard enough to be removed mechanically.

After filtration through paper, the acid aqueous solution, measuring 200 to 250 cc. is treated with saturated aqueous sodium carbonate solution (about 10 cc.) until the reaction is very faintly alkaline to litmus. It is then filtered to remove the flocculent precipitate which is produced, made alkaline by the addition of more saturated sodium carbonate solution (about 20 cc.), and extracted five times with 50 cc. quantities of chloroform. The chloroform extract is freed from watery droplets carried over mechanically by shaking with a small quantity of anhydrous sodium carbonate, filtered, and evaporated in a vacuum (water bath at 45-50 degrees). As the solution is concentrated crude crystalline ergometrine separates, the volume is reduced to 5-10 cc. After keeping at 2 degrees for an hour the crude ergometrine is collected on a filter and washed with a little chloroform.

As the alkaloidal content of ergot varies widely the yield will depend on the particular batch of ergot employed; the defatted Spanish ergot used in the author's work yielding 0.21 gram per kg.

Suitable solvents for the recrystallization of ergometrine are benzene, acetone, ethyl acetate and methylethylketone. After adequate recrystallization the alkaloid melts and decomposes at 161 to 162 degrees. Upon treatment of an acetone solution of the alkaloid with acid, crystalline water-soluble salts may be formed.

The Determination of Silver in Organic Medicaments, with Particular Reference to Colloidal Silver Ointment. G. Antoine. *Journ. Pharm. Chim., 127,* 457 (1935). The perchloric acid method proposed by Kahane and collaborators for the destruction of organic substances has been applied to the determination of silver in organic

compounds. From 0.1 to 0.3 gram of the dried sample is weighed into a 100 cc. flask, and 3 cc. of sulphuric acid (sp. gr. 1.84) and 5 cc. of nitric acid (sp. gr. 1.38) are added. When the fumes have ceased and the liquid is black, a mixture of 2 parts of perchloric acid (sp. gr. 1.61) and 1 part of nitric acid is added, drop by drop, until the liquid is entirely decolorized. After boiling for 1 to 2 minutes to dissolve the precipitate of silver chloride and drive off the perchloric acid, the mixture is cooled, and 20 cc. of water and 2 cc. of a saturated solution of ferric alum are added, and the silver titrated with 0.1 N potassium thiocyanate solution. With collargol the quantity of sulphuric acid taken should be increased to 5 cc. for a 0.3 gram sample of ointment. Samples of colloidal silver ointment, which should contain 15 per cent. of colloidal silver were found to be very deficient therein, probably owing to lack of care in preparation of the ointment, as simple mixing of colloidal silver with lanolin would result in a higher proportion of silver being found in the ointment on the periphery of the mortar. (Through *Analyst, 60,* 484, 1935.)

The Determination of Ferrous Iron in Presence of Organic Matter by Heisig's Method. G. J. W. Ferrey.* It has been recently shown that the British Pharmacopœia method of assaying saccharated iron carbonate (using diphenylamine indicator) yields results that are about 7 per cent. too high and a return to the use of potassium ferricyanide as external indicator has been recommended. In examining other methods of determining ferrous iron, the present author found that Heisig's iodate method (*J. Amer. Chem. Soc., 50,* 1687, 1928), which depends upon the liberation of iodine from iodine monochloride in the presence of concentrated hydrochloric acid and subsequent titration of the iodine with iodate, gave accurate results even in the presence of amounts of liquid glucose, acacia and tragacanth in excess of the quantities occurring in the two British Pharmacopœia preparations, saccharated iron carbonate and pill of iron carbonate.

The iodate method was applied by digesting about 2 grams of saccharated iron carbonate in a stoppered bottle with 20 cc. of 25

*Abstracted from papers presented at the science sessions of the British Pharmaceutical Conference held at Belfast, June, 1935.

per cent. sulphuric acid, adding 6 cc. of iodine monochloride reagent, 60 cc. of hydrochloric acid, and titrating with M/20 potassium iodate. In addition to the substances already mentioned, levulose, dextrose, lactose, glycerin, lactic acid, citric acid and small quantities of invert sugar are without effect upon the accuracy of the titration. Invert sugar in great excess produces a small error. In the presence of licorice, marshmallow, quinine and aqueous extract of cochineal, the method is unsatisfactory.

The Determination of the Mercury Content of Mercurochrome. R. F. Corran and F. E. Rymill.* The authors describe experiments which show that the British Pharmaceutical Codex method for the determination of mercury in mercurochrome yields low results. The method which they found satisfactory is as follows: Dissolve 0.5 gram of mercurochrome in 50 cc. of water in a 600 cc. beaker, add 10 cc. of 40 per cent. caustic soda solution and 2 to 3 grams of potassium permanganate and boil gently over a micro-burner for 15 minutes. Cool slightly and add gradually a cooled mixture of 10 cc. of concentrated sulphuric acid in 200 cc. of water, avoiding loss by spattering by covering the beaker with a clock glass. Allow to cool and add, in small portions and with rapid stirring, a slight excess of 10 volume hydrogen peroxide. Replace beaker over the micro-burner, add an excess of 5 per cent. potassium permanganate solution and boil gently for 10 minutes, adding more permanganate if necessary. Now add dilute oxalic acid solution, drop by drop, until a water-white solution is obtained and precipitate the mercury as sulphide by the usual procedure.

A determination of mercury in mercuric chloride by this method indicated 73.9 per cent. as compared with a theoretical content of 73.85 per cent. The British Pharmaceutical Codex method yielded a result of 71.4 per cent. for the same sample. The analysis of a sample of mercurochrome indicated 26.00 and 24.07 per cent. of mercury by the alkaline permanganate oxidation and the British Pharmaceutical Codex methods respectively.

*Abstracted from papers presented at the science sessions of the British Pharmaceutical Conference held at Belfast, June, 1935.

SOLID EXTRACTS

By Ivor Griffith, Ph. M., Sc. D.

Nebuchadnezzar may have been crazy when he ate green grass in a most unkingly way—but he at least knew his vitamin C, for recent tests indicate that some of nature's green children, freshly harvested are richer in that life supporter than even the much touted orange juice. Scientists are now studying the methods of handling and storing green vegetables to conserve their content of this valuable vitamin.

Here is good news for that selected group of pollen punished people known as the hay-feverites. And this is their sneezing season —for hereabouts the ragweed is lovemaking and sending its torture-tinctured messages from bloom to bloom. And wherever the sensitive nose of the pollinotic person intercepts these lovegrams, his snort and sneeze disturb the tranquil ether.

And the good news is reflected in this item—Dust-proofing the living rooms and bedrooms of houses in the Middle West is advocated by the Red Cross, which finds that this can be done for two or three dollars a house.

Spinach sponsors have just had a scientific setback, and Johnny Junior a real basis for his objection to this verdant vegetable.

Mother, it seems, is only partly right when she pleads with Junior to "Eat your spinach—it's good for you."

It's good for him, but not nearly as good as it's been cracked up to be. It just can't be spinach that enables Popeye the Sailor to perform all those red-blooded feats in the movies. For spinach contains iron, but—

New studies at the University of Wisconsin, carried on in those agricultural chemistry laboratories which have already made countless contributions to the knowledge of vitamins and minerals, show

that only 25 per cent. of the iron in spinach is "available," as scientists put it. That is, only one-quarter of it is in a form that is usable by the body. Other vegetables are no better than spinach in this respect.

Solid carbon dioxide (dry-ice), a by-product of the fermentation industries is now in the jewelry business. Its special use in that field is to detect the spurious from the genuine, especially the diamond and the pearl. The real gems, when touched with the colder-than-ice caked gas, emit a characteristic "squeal", and are accordingly identified. Likewise a quartz lens may be distinguished from a glass lens.

Insect powder (from pyrethrum) and powdered derris root and their extracts are well established as insecticides. Recently someone conceived the notion that, since they functioned so well as bug killers, they might be good parasiticides. Accordingly, we find them now, in ointment form, prescribed for the treatment of scabies. They are said to be both effective and non-irritating.

In those hectic days, before the passage of the Food and Drugs Act, it seems, that one had to be more than hardy to survive. No wonder our forebears were sturdy. Read this *actual* analysis of a pound of raisins purchased from a street stand. Prunes, very dirty. Beans. Rice grains. Dirt so thick on upper surface that the raisins looked fuzzy; numerous hairs visible. Microscopic examination showed the following: Hairs, human and animal. Fragments of animal and vegetable fibres, cotton, wool, etc., dyed green, blue, yellow, brown, pink and gray. Partly disintegrated bast fibres similar to those from straw, probably from manure. Partly disintegrated bran fragments, probably from manure. Sand. Cornstarch, rice and wheat fragments. Spores of yeasts and molds. Pine wood fragments. Fragments of three other unidentifiable woods. Unidentifiable vegetable tissue containing spiral ducts. Tobacco leaf fragments, probably from cigar butts. Fragment of yellow stained ciga-

rette paper. Fragment of charred cigarette paper. Fragment of cigarette tobacco. Fragments of wings and legs of insects.

Dr. Charles H. LaWall vouches for the accuracy of this nigh unbelievable analysis.

"Ether frolics" were once as popular an evening game as "post-office" and "spin the plate." "It was also quite popular at this time (1835) for lecturers to demonstrate for entertainment certain recently discovered chemical and physical phenomena including the intoxicating character of ether and also for groups of young people to engage in what at that time were known as 'ether frolics,' when all would inhale the vapor and exhibit the characteristic stimulation, followed by unconsciousness, if carried that far.

"It is recorded that at an entertainment in Athens, Georgia, in 1840, when the effects of ether were being demonstrated, a young man named Wilhite compelled a negro boy to inhale ether. The boy resisted but it was forced upon him and he became completely insensible. From that time it became a common practice in that district for young people at social gatherings to inhale ether for its effects and the resulting fun."

Which proves that young people of this day and age are not so devastatingly different from youngsters of any day and age—except that they are better informed—on the non-essentials.

"Atramentaceous fluid"—or ink, is known to have been used by the Egyptians as early as 2500 B. C. Old Papyri (which are in existence today) dating back to that time were written upon with a black ink which was a mixture of lampblack and glue with a preservative to prevent decomposition. In China, the invention of ink is ascribed to Tien-Tchen, who lived between 2697 and 2597 B. C. China ink or India ink was made by the Chinese from the soot produced from the smoke of pines and the oil in lamps mixed with the isinglass of asses' skins and musk to correct the odor of the oil. The Chinese moulded their ink into cakes or sticks because of a scarcity of bottles in ancient time. The Hebrews and the Arabians had similar methods for making ink. Ink was used in Bible times for the

book of Ezekiel, Chapter Nine, records the action of the man with the inkhorn.

"And the Lord said unto him, (the man with the inkhorn), Go through the midst of Jerusalem, and set a mark upon the foreheads of the men that sigh and that cry for all the abominations that be done in the midst thereof."

Ink here was used as a matter of life or death for if we read further we find the following passage,

"Slay utterly old and young, both maids and little children, and women: but come not near any man upon whom is the (ink) mark: and begin at my sanctuary."

And speaking of ink—few people knew—until Ripley rolled along—that there exists an actual "river of ink." It is located in Algeria, in northern Africa. Chemical examinations of the waters of the streams combining to form this river revealed that one of the streams is impregnated with iron from the soil through which it flows while the other stream carries tannin from a peat swamp. When the two streams join, the chemical action between the tannic acid, the iron and the oxygen of the water causes the formation of the black ferric tannate, making a natural river of ink, of the same chemical constitution fundamentally, as most of all old-time inks.